

Translation

PATENT COOPERATION TREATY  
PCT

PCT Application  
PCT/CN2003/000594




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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

See Form PCT/IPEA/416

|   |   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
|---|---|---|---|---------------------|-------------------------------------|----------|--------------------------------------|--|-------------------------------------|----------------------------|---|---|-------------------------------------|-------------------------|--------------------------------------|--|---------------------------------------|---|
| Applicant's or agent's file reference<br><b>P2003278E</b>   | <b>FOR FURTHER ACTION</b>   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| International application No.<br><b>PCT/CN03/00594</b>  | International filing date (day/month/year)<br><b>24. Jul. 2003 (24/07/2003)</b>   | Priority date (day/month/year)<br><b>30. Dec. 2002 (30/12/2002)</b> |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| International Patent Classification (IPC) or national classification and IPC<br><b>IPC<sup>7</sup> H01L 39/00</b>   |   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| Applicant<br><b>TSINGHUA UNIVERSITY et. al.</b>   |   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>5</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/> Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/> Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/> Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/> Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/> Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/> Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> |   |   | <input checked="" type="checkbox"/> Box No. I | Basis of the report | <input type="checkbox"/> Box No. II | Priority | <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> Box No. VI | Certain documents cited | <input type="checkbox"/> Box No. VII | Certain defects in the international application | <input type="checkbox"/> Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> Box No. I   | Basis of the report   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. II   | Priority  |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. IV   | Lack of unity of invention  |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input checked="" type="checkbox"/> Box No. V   | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VI   | Certain documents cited   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VII  | Certain defects in the international application  |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| <input type="checkbox"/> Box No. VIII   | Certain observations on the international application   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| Date of submission of the demand<br><b>12. Jul. 2004 (12/07/2004)</b>   | Date of completion of this report<br><b>8. Jun. 2005 (08/06/2005)</b>   |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |
| Name and mailing address of the IPEA/CN<br>The State Intellectual Property Office, the P.R.China,<br>6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China<br>100088<br>86-10-62019451  | Authorized officer<br><br>Telephone No. (86-10)62084869                    |   |   |                     |                                     |          |                                      |  |                                     |                            |   |   |                                     |                         |                                      |  |                                       |   |

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/CN03/00594

## Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-6, 8, 10-14 as originally filed/furnished

pages 7, 9 received by this Authority on 30. May. 2005 (30/05/2005)

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the claims:

pages \_\_\_\_\_ as originally filed/furnished

pages \_\_\_\_\_ as amended (together with any statement) under Article 19

pages 15-17 received by this Authority on 30. May. 2005 (30/05/2005)

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the drawings:

pages 1-7 as originally filed/furnished

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/CN03/00594Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

## 1. Statement:

Novelty (N)

|        |             |     |
|--------|-------------|-----|
| Claims | <u>1-18</u> | YES |
| Claims | <u></u>     | NO  |

Inventive step (IS)

|        |                           |     |
|--------|---------------------------|-----|
| Claims | <u>2-8,12,16</u>          | YES |
| Claims | <u>1,9-11,13-15,17-18</u> | NO  |

Industrial applicability (IA)

|        |             |     |
|--------|-------------|-----|
| Claims | <u>1-18</u> | YES |
| Claims | <u></u>     | NO  |

## 2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1: US 6,251,835 B1 (26 Jun. 2001)

D2: CN 1171635 A (28 Jan. 1998)

1、Claim 1 lacks an inventive step according to PCT Article 33(3). D1 describes High Temperature Superconductor(HTS) surfaces Planarization, comprising the following technical features: High Temperature Superconductor(HTS) surfaces is bombarded with gas cluster ions of having energies greater than 7keV and less than 200keV (claim 1 claims 5eV—50keV which is overlapped with D1), to reduce both the surface roughness and the crystallinity of the surface and to impair the high temperature superconducting properties of said surface (see col. 3 line 44 to 61, claims 1,5). Comparing the technical solution of independent claim 1 with the summary of D1, the only difference is “an angle of incidence is between 5 and 85 degrees”. D2(CN1171635A) discloses a method for removing asperities from the surface of a high temperature superconducting thin film (Ti-Ba-Ca-Cu-O superconductor), comprising the following technical features: exposing the surface of a high temperature superconducting film to an inert ion beam at an angle of incidence of from 5 to about 30 degrees relative to the surface of the thin film, a power is 300-500V, 300mA (see page 5 line 6 to page 8, claim 1). In D2, it is certain that ion beam have energy by bombarded with sure power. Considering the D1 and D2, the technical solution of independent claim 1 is obvious to those skilled in the art and can not produce unexpected technical effects. Therefore the technical solution of claim 1 lacks non-obvious features and an inventive step. The claim 1 does not appear to be an inventive step.

2、Claim 9 lacks an inventive step according to PCT Article 33(3). D2 describes high temperature superconducting thin film is Ti-Ba-Ca-Cu-O superconductor (see page 5 line 7, claim 1). Therefore claim 9 lacks an inventive step.

3、Claim 10 lacks an inventive step according to PCT Article 33(3). D1 discloses High Temperature Superconductor(HTS) surfaces is bombarded with gas cluster ions to reduce both the surface roughness (i.e. external) and the crystallinity (i.e. body) of the surface (see claim 1). Therefore claim 10 lacks an inventive step.

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

4、 Claim 11 lacks an inventive step according to PCT Article 33(3). D1 discloses High Temperature Superconductor(HTS) surfaces is bombarded with gas cluster ions to reduce both the surface roughness and the crystallinity of the surface (see claim 1), i.e. HTS is single crystalline or polycrystalline. Therefore claim 11 lacks an inventive step.

5、 Claim 13 lacks an inventive step according to PCT Article 33(3). D1 discloses High Temperature Superconductor(HTS) is deposited on single crystalline or multi-crystalline (see col. 3 Line 5 to 12). Therefore claim 13 lacks an inventive step.

6、 Claim 14 lacks an inventive step according to PCT Article 33(3). D1 discloses the cluster beams of the gases, such as Ar, Ne, N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, SF<sub>6</sub>, etc (see col. 3 Line 51 to 54). Therefore claim 14 lacks an inventive step.

7、 Claim 15 lacks an inventive step according to PCT Article 33(3). D1 discloses that HTS film is annealed after be bombarding, the annealing temperature is 450-870°C (see col. 5 Line 23 to 38, claims 1,12-14). Therefore claim 15 lacks an inventive step.

8、 Claim 17 lacks an inventive step according to PCT Article 33(3). D1 relates to High Temperature Superconductor(HTS), comprising the following technical features: High Temperature Superconductor(HTS) surfaces is bombarded with gas cluster ions of having energies greater than 7keV and less than 200keV, to reduce both the surface roughness and the crystallinity of the surface and to impair the high temperature superconducting properties of said surface (see col. 3 line 44 to 61, claims 1,5). Also, fig.4 of the D1 shown is the YBCO surface appears inclined cone appearance after YBCO has been bombarded. D2(CN1171635A) discloses high temperature superconducting thin film (Ti-Ba-Ca-Cu-O superconductor), comprising the following technical features: exposing the surface of a high temperature superconducting film to an inert ion beam at an angle of incidence of from 5 to about 30 degrees relative to the surface of the thin film, a power is 300-500V, 300mA (see page 5 line 6 to page 8, claim 1). In D2, it is certain that ion beam have energy by bombarded with sure power. Considering the D1 and D2, the technical solution of independent claim 17 is obvious to those skilled in the art and can not produce unexpected technical effects. Therefore the technical solution of claim 17 lacks non-obvious features and an inventive step. The claim 17 does not appear to be an inventive step.

9、 Claim 18 lacks an inventive step according to PCT Article 33(3). D1 discloses that HTS film is annealed after be bombarding, the annealing temperature is 450-870°C (see col. 5 Line 23 to 38, claims 1,12-14). Therefore claim 18 lacks an inventive step.